KNOWLEDGE

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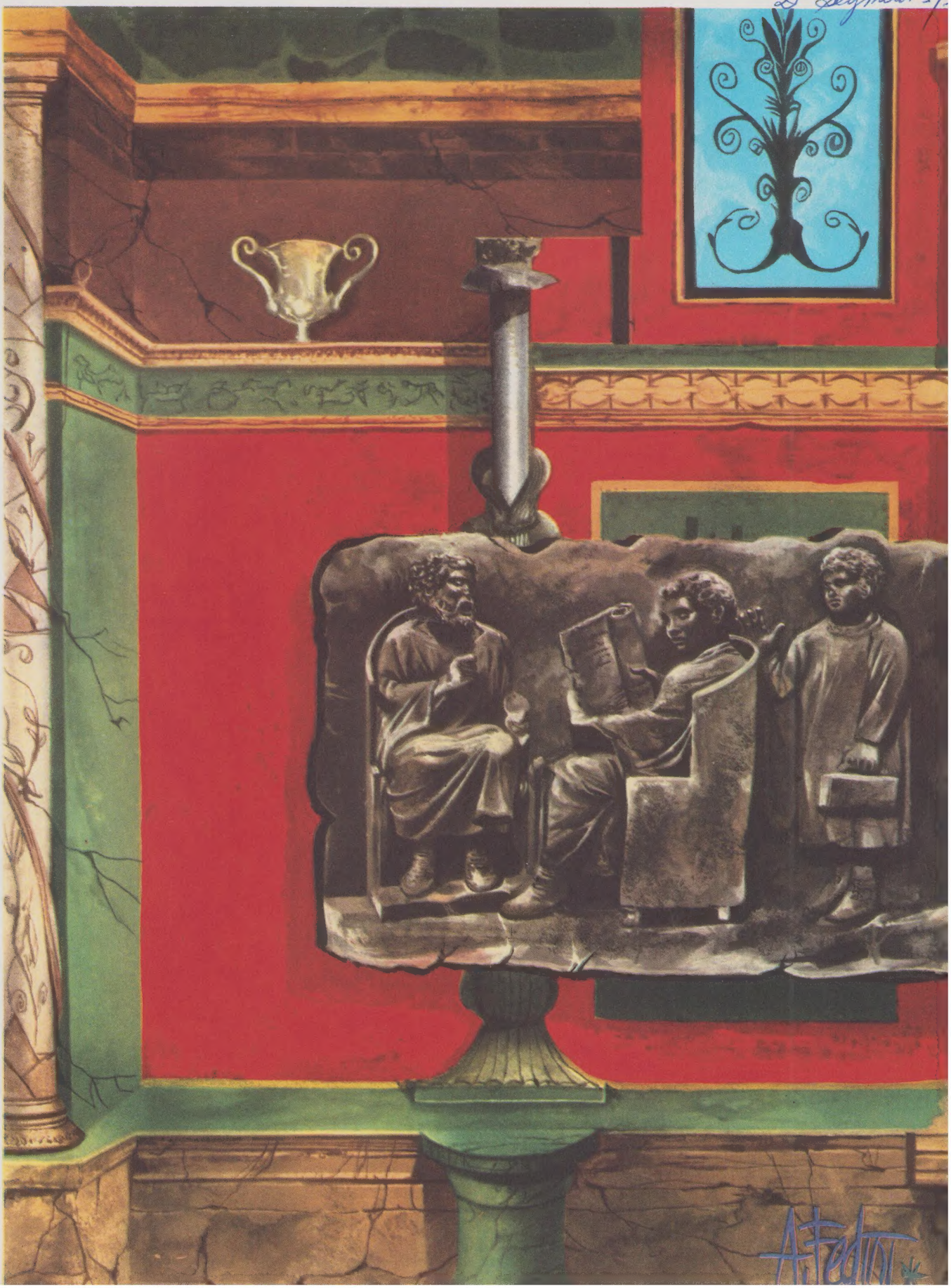

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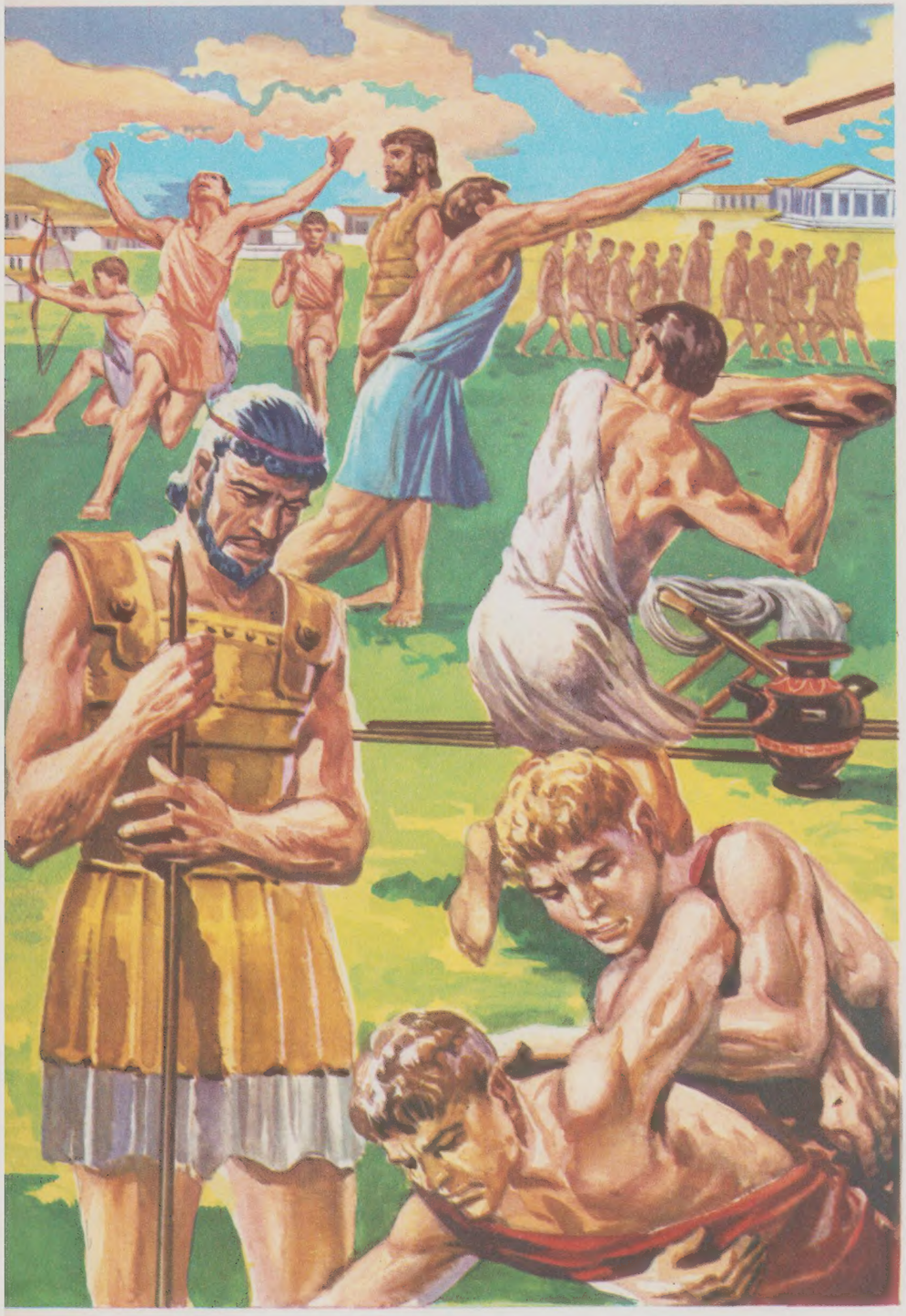
SCHOOLS (part one)



The education of Spartan boys was designed to turn them into good soldiers

Previous page: Bas-relief from Pompeii, showing an elementary school in Ancient Rome

HOWEVER far back we go into history, we find that a necessary and natural duty of a community is to prepare its young people for their future adult life. We call this preparation *education*, and it is the schools which carry much of the responsibility for this work. Obviously, the higher the degree of civilisation attained by a people, the higher the level of the education it can give to its children. Also, the kind of education provided depends upon the nature of the society – whether it has a predominantly religious or military form, for example.

Education in Ancient Greece

Ancient Greece was divided into a number of independent city states. Of these states, Athens and Sparta were the most important. They had a common religion, but in their form of government, their laws, their educational system, and their way of life, they differed greatly. The Spartans were exclusively a military people, while the Athenians were predominantly a people of artistic and literary interests.

Education in Sparta

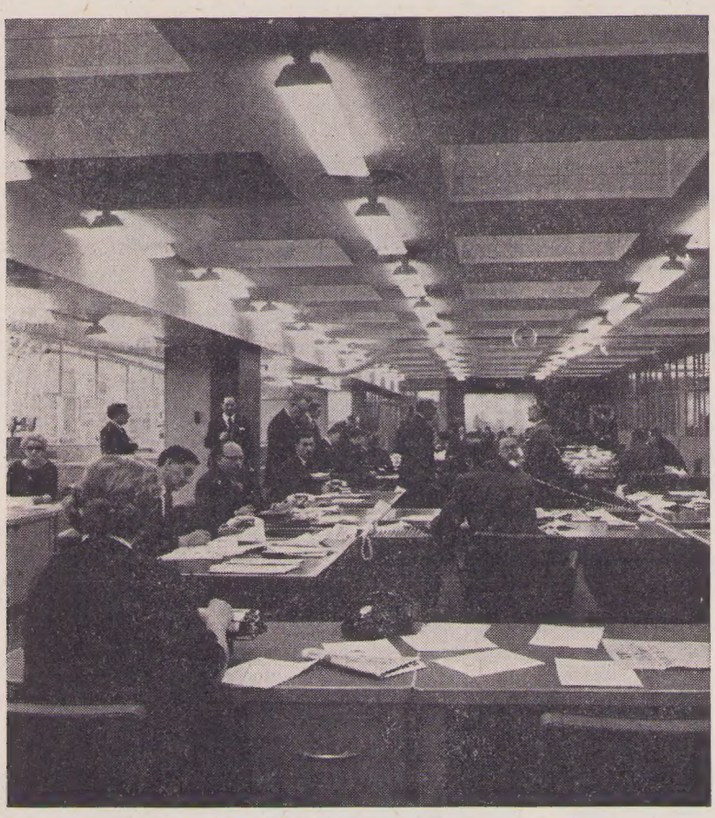
Aristotle said of Sparta that it appeared to be the only state in which the lawmaker paid attention to the education and discipline of the citizens. The greatest lawmaker of Sparta was Lycurgus (9th century B C), and his political framework and educational system were practised for centuries.

For Lycurgus, the aim of education was to form soldiers capable of bearing the hardships of a life of privation and danger. Education in Sparta was designed, planned, and controlled by the state for the military needs of the state. For this reason, every Spartan had to be physically strong and brave.

In his earliest years the child was taught by his mother according to the instructions set down by the state. Spartan mothers were responsible for the physical development of their sons; they had to make them used to enduring the hardship of bad weather and to stand up to the test of hunger and thirst. At the age of seven, the Spartan boy was taken from his family, and from that moment the state maintained and educated him strictly according to its principles. The Spartan boy belonged to his country, and its government subjected him to a very strict education aimed to produce a perfectly disciplined soldier. He was given the bare minimum of reading and writing to do, and no cultural education at all. He would learn by heart the works of those poets who wrote of victories in war and love of their country. The chief occupation up to the age of 18 was gymnastics and hunting. For the next two years the young Spartan was instructed in the use of arms and in military matters exclusively. By the age of 20 he was sufficiently trained as a soldier and could be called

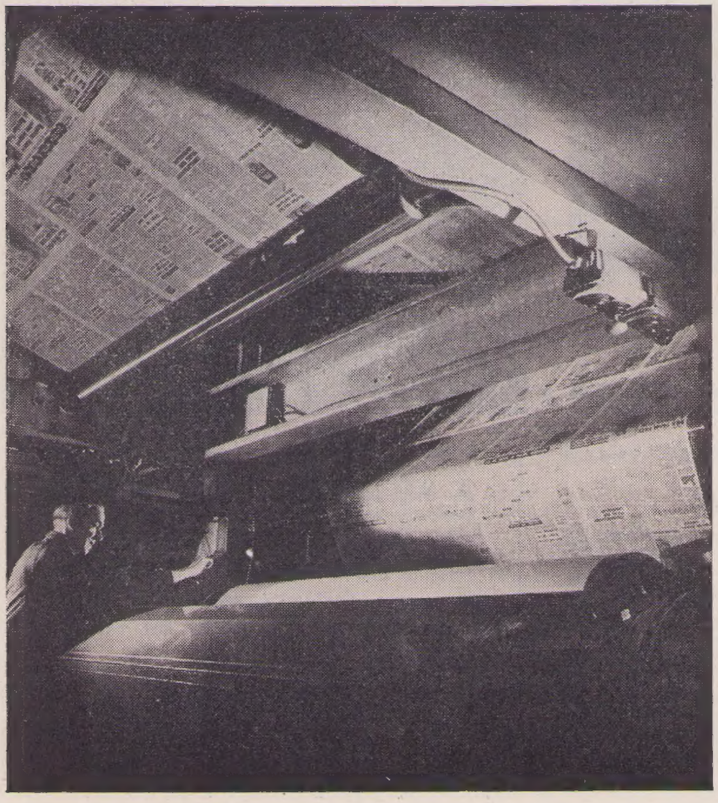
KNOWLEDGE NEWS
Week beginning 28th April 1963

A DAY IN THE LIFE OF A NEWSPAPER



(Above) The news room of the *Daily Mirror*, a newspaper with one of the largest circulations in Britain.

(Below) A large rotary printing machine which can churn out over 30,000 copies of a newspaper an hour.
[*Photo by courtesy of Walter Nurnberg and Tillotson Newspapers Ltd.*



HAVE you ever thought about how a big national daily newspaper is produced and delivered to your door or newsagent, day after day, on practically every day of the year?

It is a highly complicated business, yet the people who work in newspapers look upon their job as straightforward enough.

The daily newspaper's day usually begins around 10 a.m. with the arrival of the first reporters and the various heads of departments, such as the news editor, features and sports editors, and, of course, the editor himself.

The news flows in

Immediately, these department heads begin assessing the news as it flows in from hundreds of local correspondents up and down the country, and from the big news agencies like Reuter's, Press Association and the Exchange Telegraph Company.

Naturally, all the news of the day, both from home and abroad, cannot be contained in the 16 or 20 pages of newsprint which make up the complete newspaper. A choice has to be made so that all the most important stories are included in the next morning's paper.

For this reason, the various heads of departments compile news lists giving brief details of the stories they intend concentrating on during the day. These lists are discussed at the morning and afternoon news conferences which they attend in the editor's office.

Specialists at work

As the day moves on, reporters are out and about on varied assignments. The newspaper's specialists are busy in their respective fields; for instance, the air and defence correspondents may be in Whitehall attending press conferences; the court reporters may be in the High Court and at the Old Bailey – perhaps a big murder trial is coming to its conclusion. Political correspondents may be arriving at the House of Commons; industrial correspondents may be covering a major strike.

Throughout the day, the foreign editor has been in touch with his staff in different parts of the world, and usually knows by early evening when he can expect the latest news on a Middle East crisis, or of the launching of a space rocket at Cape Canaveral.

As the news flows in from all parts, it is passed to the sub-editors, whose job it is to check the reporter's facts, cut or shape the story to the correct size and decide, under the guidance of the night editor and the chief sub-editor, where it is to be placed in the paper.

As the paper takes shape, first edition time is coming up fast. But there is still more to be done. Sports reporters are perhaps out at an evening football game or an important boxing match. Their stories have to be telephoned speedily from the press box or the ringside – but it all must get into the paper.

Then maybe there is drama, as a major news story breaks with only minutes to edition time. A less important story is 'killed', or knocked out of the paper, and the fresh story takes its place before the giant rotary presses thunder out some 30,000 or more copies an hour.

Remember most national papers have three or four editions each night, so that the moments of drama and snap decisions can come at any time – even in the small hours of the morning.

A near miracle

A few pence is a small enough sum – yet it brings to your breakfast table each week-day an achievement sometimes little short of a miracle.

A digest of world happenings; the assembling of authoritative opinions on many topics; the presentation of current events illustrated with vivid and often striking news photographs; that is what goes into the making, printing and timely delivery of your morning newspaper.

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BIRD-MAN

Nearly 200 years before the launching of the first astronaut, thousands of upturned faces stared at a little group of people on a high tower.

The place was Port Louis in Brittany, on 29th September 1776. The central figure on the tower was a young man of 24 years, Dominic Dufour, who was under sentence of death for murder. He had been promised his liberty if he would allow himself to be pushed off the tower, wearing a newly invented device which, it was hoped, would enable a man to fly.

Dufour accepted, and, clad in a wing-like cloak made of fine cloth and feathers, he was pushed off the forty-foot tower and plunged down. After fluttering a little in a brisk wind, he landed safely after a flight of 30 seconds. The crowd went wild with excitement and delight. We expect Dufour was rather pleased too!

Letter from the Editor

37 HERTFORD ST.
LONDON W.1

THERE have been suggestions in the past that London should cease to be Britain's capital – it is thought to be much too crowded *and* much too important.

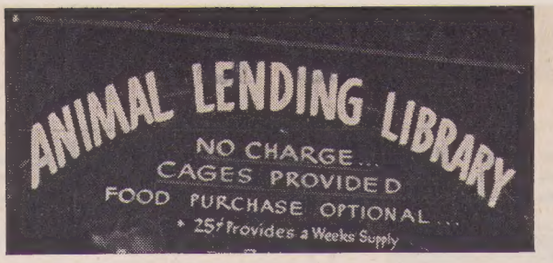
London is the political, industrial, financial, social, artistic and sporting capital of Britain. It has nearly one-fifth of Britain's population. Moreover, it is much easier to obtain jobs in London than in the rest of Britain.

It has been suggested that this concentration of wealth, power and influence in London is a bad thing for the rest of the country, and our political capital should be moved to York.

Actually the idea of creating an artificial capital away from the most important city is by no means a new one. The capital of the United States is Washington, though the largest city in the United States is New York. Brasilia is the capital of Brazil. It was created from swamp and jungle, away from Brazil's most important city, Rio de Janeiro. Canberra is the capital of Australia, though overshadowed in size by Sydney, Melbourne and Brisbane.

Most European capitals are their countries' most important cities, though many of them are not as old as the state. Laon and Kiev were the ancient capitals respectively of France and Russia. England's ancient capital was Winchester – who knows, it might be again some day!

John Chancellor



A PET FOR A WEEK

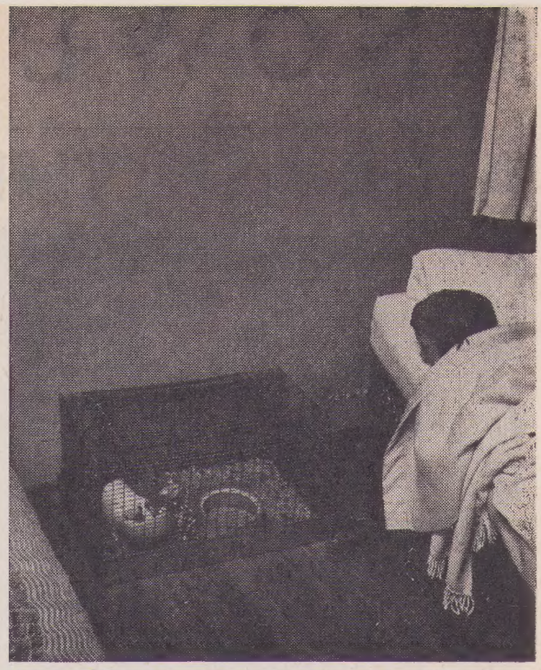
In parts of the United States, you can borrow an animal in the same way as a book from a library.

THESE pictures, taken in Sacramento, California, show one of the most unusual 'libraries' in the world. From this 'library' various harmless animals (from snakes to guinea pigs) are lent out free.

Sacramento is not the only one of these organisations in the United States. They are run by junior museums. Youngsters can go with their parents and choose an animal to take home for a week. A special cage is provided by the museum, and also careful instruction on the care and feeding of the animal. While in the borrower's possession, the zoo keeps a close check on the animal for health's sake.

This scheme could be open to many abuses. Animals might be cruelly treated or neglected. However, reports show just the opposite. The instances of maltreatment are extremely few. In fact, in its object of teaching children to love and care for animals, the scheme has been remarkably successful.

As well as lending animals to individuals, the junior museums also lend them to schools for group lessons.



Alice Gordon keeps her pet for the week (a guinea pig) beside her while she sleeps.

Lenora Brooks puts a rabbit she has just borrowed into the family's car.

Youngsters examine some of the pets in the junior museum. Here the museum director tells them all about the king snake.

FACTORS

A word game

The following statements are either 'true' or 'false'. When one is 'true' score the *first* number, but if you think that it is 'false' score the *second* number. Change the numbers into letters (1=A; 2=B; and so on). Put these letters into the squares to make a five-letter word reading down the frame.

Australia is the home of the Maoris (20) – (19)
Long John Silver is a character from Kidnapped (1) – (16)
Magenta is a red dye (1) – (2)
The term 'farad' comes from the name of the great scientist, Michael Faraday (18) – (12)
The obverse side of a coin or medal is that on which the head is shown (11) – (5)

ANSWER

(New Zealand is the home of the Maoris, and Long John Silver comes from *Treasure Island*)
Spark

HEROIC PIGEON

In the Royal United Services Museum, London, is a stuffed pigeon, a fine blue-grey bird in a glass case numbered 2709. It is a battle-scarred hero of the First World War.

During the battle of Menin Road in France in 1917, it was sent to carry a message to divisional headquarters calling for urgent reinforcements. As it took off, a German sniper spotted it and fired.

The bullet hit the pigeon in the leg and drove the message-case right into its body, the bullet passing out of the bird's back.

Yet the bird struggled on although mortally wounded. It took nine hours to reach headquarters, a distance of just nine miles. The message was delivered; then the bird died.

While on the subject of pigeons it is interesting to note the longest recorded flight by a homing bird is said to have been that of a pigeon owned by the Duke of Wellington. It was released from a sailing ship off the Ichabo Islands, West Africa, on 1st June 1845. The bird dropped dead one mile away from its loft in London, and must have flown seven thousand miles in fifty-five days.

A REMINDER FOR READERS OF YELLOW KNOWLEDGE

Have you obtained your standard binder for Volume 6, or your Easibinder for Volumes 5 and 6?

If not, see your newsagent right away, or in case of difficulty write to Department B at our London address.

YORKIST KINGS

MEDIAEVAL England was many things. It was an age of churchgoing, the midday break for prayer, and the peasant ploughing his field. But it was also the turbulent, seething age of civil war, the great nobles, and vast private armies. The last phase of the Middle Ages glitters with mighty names: Warwicks, Buckinghams, Gloucesters, Nevilles, Lancastrians, and Yorkists. Many members of the nobility had royal blood in their veins, and there was less certainty about who should be king than at almost any other time in English history. In the short space of less than 100 years, Plantagenets, Lancastrians, Yorkists, and Tudors tried their hands at kingship. The overthrow of Richard II by the Lancastrian Henry IV in 1399 was the opening of an era, for it meant that the throne belonged to the man capable of seizing it. However, the Lancastrians proved they could not govern and the Yorkists took over.

The chaos of the 15th century ended in the stability of Tudor rule. Yet the Tudors were not the first strong kings of the period. Many people think that the New Monarchy came not with the Battle of Bosworth but with the Battle of Towton which, in 1461, brought Edward IV, the first Yorkist king, to the throne (see page 1868).

Edward IV was a young man of 19. He was the first king made by the Earl of Warwick, 'the king-maker'. Edward's claim to the throne was inherited from his father, Richard, Duke of York, who had claimed it against the weak and also mad Lancastrian King Henry VI. Richard had been killed, but Edward was more successful. He had the support of Warwick, the greatest noble not of royal blood this country has ever seen. His lands included not only the vast earldoms of Warwick and Salisbury but also the immense tracts of Yorkshire which belonged to his family, the Nevilles.

All the great nobles had their own paid armies. The 'over-mighty subject' was a perpetual problem of the late 15th century. And although the nobility glittered brightly at this time, it destroyed itself in its wars. From Tudor times England has been governed largely by the king or the king's men.

A growing rift

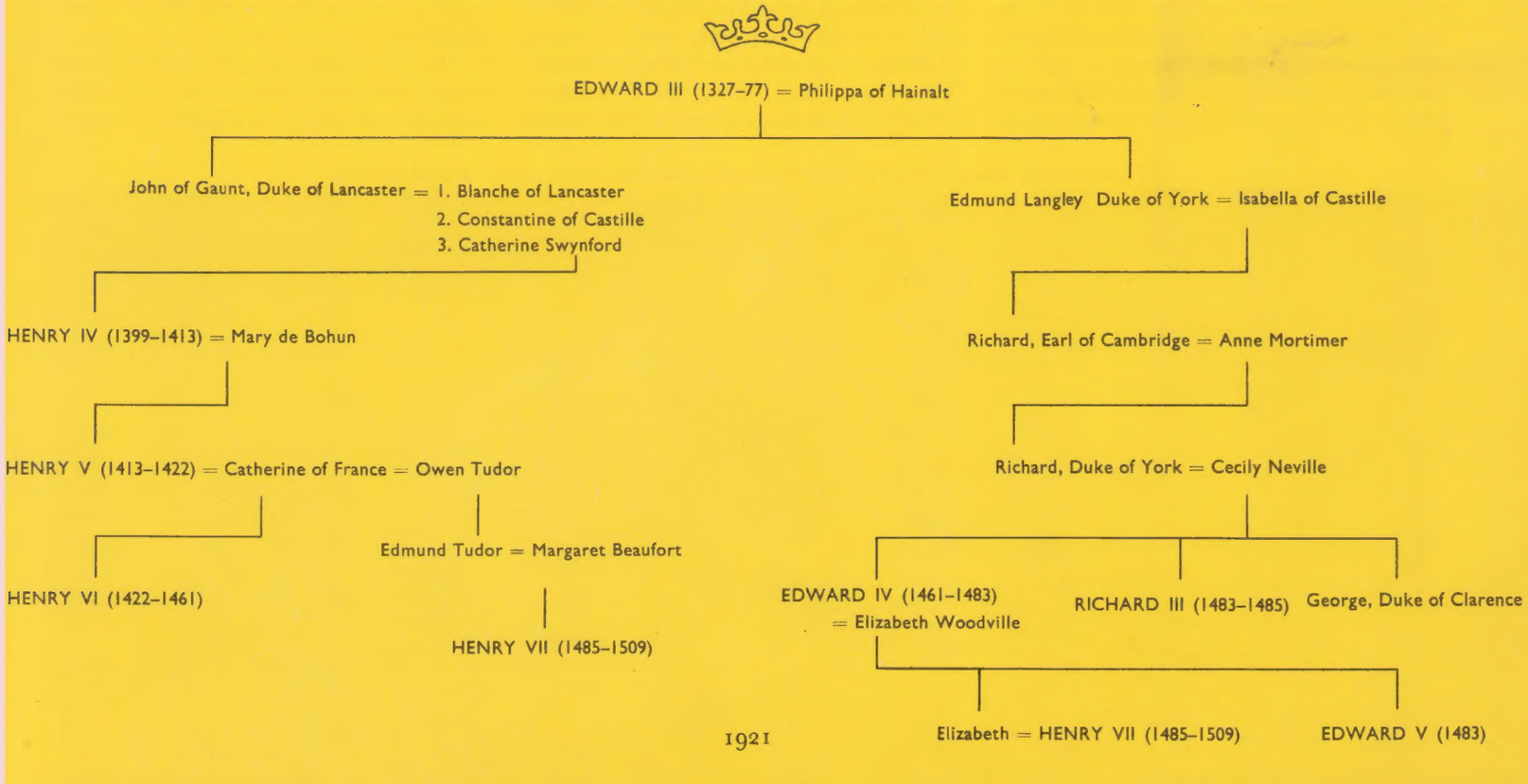
Warwick seemed invincible. He conducted his own foreign policy of friendship with France. But Edward soon showed who was master. In 1464 he announced that he had secretly married Elizabeth Woodville, a beautiful widow with Lancastrian connections, at a time when Warwick was trying to arrange a marriage between Edward and a French princess. Edward also showed a preference for friendship with Burgundy, France's enemy. So Warwick was not only humiliated and ignored, but his policy was flouted. Worse was to follow. Lands and titles were showered on

Edward IV

the new queen's five brothers, and important husbands were found for her seven sisters. Her father was created Earl Rivers, and became Lord Treasurer of England. Warwick was more and more left out of the business of government. Edward was obviously developing a party of his own.

Lancastrian restoration

Warwick went over to France, where, with


EDWARD III (1327–77) = Philippa of Hainalt
John of Gaunt, Duke of Lancaster = 1. Blanche of Lancaster
2. Constantine of Castille
3. Catherine Swynford
Edmund Langley Duke of York = Isabella of Castille
HENRY IV (1399–1413) = Mary de Bohun
Richard, Earl of Cambridge = Anne Mortimer
HENRY V (1413–1422) = Catherine of France = Owen Tudor
Richard, Duke of York = Cecily Neville
Edmund Tudor = Margaret Beaufort
HENRY VI (1422–1461)
EDWARD IV (1461–1483)
= Elizabeth Woodville
RICHARD III (1483–1485)
George, Duke of Clarence
HENRY VII (1485–1509)
Elizabeth = HENRY VII (1485–1509)
EDWARD V (1483)

Richard III

the help of Edward's treacherous brother, the Duke of Clarence, he raised an army. He even made an alliance with his former enemy, Margaret of Anjou (wife of the deposed Lancastrian king Henry VI), and returned to England in 1470 with the object of restoring Henry VI to the throne. That the Earl of Warwick, a Yorkist supporter, could engineer a Lancastrian restoration speaks badly for the sincerity of the quarrelling noblemen in the 15th century. The imbecile Henry VI was brought out of the Tower of London, where he had been imprisoned, and placed on the throne. Edward, caught unawares, went into a hurried exile in Burgundy. Warwick was, for a brief while, the real ruler of England. But Edward was not the man to give up his throne so easily and was soon on his way back. The versatile Duke of Clarence, who changed his colours with the dexterity of a chameleon, left Warwick and sided once more with his brother. The Yorkists had far greater resources than the Lancastrians and defeated them decisively in two battles. At Barnet the Earl of Warwick himself fell, slain in a battle which was fought in a heavy mist. The retreating Lancastrian force was caught in the West Country, and at Tewkesbury, on 4th May 1471, was shattered by Edward's army. The following day it was announced that Henry VI had died through 'sheer displeasure and melancholy'. He was undoubtedly displeased and melancholy at the news of Tewkesbury, but his death was the result of a command of the King.

The Battle of Tewkesbury marks the opening of a period of peace and stability. Warwick had been slain and his estates divided between the King's brothers, Clarence and the faithful Gloucester. The danger of the 'over-mighty subject' receded, and the King governed through men he chose himself. The Great Council, and even Parliament, became less and less important. Edward's extensive lands made him the first financially solvent king of the century. In 1478 the Duke of Clarence, suspected of intriguing with the opposition yet again, was killed by order of the King, and so even that dangerous man was out of the way.

A golden age

What was the England of Edward IV like? In the first place it was, of course, an agricultural country, with no large towns by present-day standards except London. Agricultural life was undergoing a significant change. In the 13th century most of the work was done by labourers in return for payments 'in kind', such as bread, clothing, or pasture land for their sheep. They owed their labour as a matter of duty, not choice, and even if they wished they could not leave their landlord and find employment elsewhere. Things were very different in the 15th century. Money wages had gradually come to replace payment 'in kind', and instead of labour dues the tenant paid a money rent for his land. Equally important was the growing practice of 'mobile labour' – the ability to find work where conditions were best and wages highest. All this was made possible by the shortage of labour, for landlords competed to get the limited number of farm workers available. The 15th century saw the origin of the self-made tenant farmer, the *yeoman*, and has been called the 'golden age of the English peasant'.

Although the farm labourers were prospering, England as a whole was not, and Edward's reign is important for a revival in prosperity in most fields of business activity. Trade was severely depressed in the mid-15th century, and Edward took a great personal interest in its recovery. He ordered that all goods as far as possible should be carried in English ships, and tried to limit the privileges of foreign merchants. In 1468 he actually went to war with the Hanseatic League, a powerful Continental trading organisation centred on the Baltic Sea. But when he returned to the throne in 1471, he came in ships provided by the Hanse in return for restoring their favoured position. So the extensive northern trade, including furs, tar, rope, and cloth, was in the hands of foreigners.

Nevertheless, Edward's reign was a notable one for the merchants. The wool, wine, and especially the cloth trades made great strides, and in the case of cloth rapidly became the foundation of a great prosperity.

The background for this prosperity was peace. Edward abandoned the costly attempts of previous English kings to

The principal routes of English and Hanseatic trade during the 14th and 15th centuries

gain the French crown, with one solitary exception. In 1474 he raised a huge tax for a French expedition, but never undertook it. Instead he allowed himself to be bought off by the French king, Louis XI, for a payment of 75,000 gold pieces at once, and an annual pension of 25,000 gold pieces. It was certainly the most prosperous war of the 15th century!

Richard III

Edward died at the early age of 40, worn out by his riotous way of life, performed as Shakespeare tells us 'to the lascivious pleasing of a lute'. The new king, Edward V, was a boy of 12, and his reign began and ended in 1483. Up till now Richard, Duke of Gloucester, had shown none of the qualities which made him the favourite villain of the Tudor historians and many who followed them. They show him as a deformed, vile-minded monster, born with a full set of teeth, responsible for the murder of his brother Clarence and of Edward V with his brother (the two 'princes in the tower').

Up till now, Richard's conduct had been virtuous in the extreme. He had remained faithful to his brother's cause whether that cause seemed won or lost, and had gained a fine reputation as a soldier and administrator in the north. Whether power went to his head, or whether he has been maligned by historians, we may never know. What is certain is that, in alliance with a hitherto insignificant nobleman, the Duke of Buckingham, he did make a determined effort to seize the throne. Yet it could be argued that after the violent times of the Wars of the Roses a grown man was needed to wear the crown.

Richard was Protector of the Realm during the minority of the young Edward V, and used his position to develop his plans. Buckingham was given enormous

The two princes in the tower, just before they were murdered in their sleep, possibly by order of Richard III

power throughout the south of England while Gloucester himself controlled the north. Edward and his young brother Richard were put into the Tower. There they were murdered – probably, though not certainly, upon Richard's order. The party led by Edward IV's widow was horrified. She herself fled into sanctuary in Westminster, together with the Marquis of Dorset and other supporters. Lord Hastings, the most powerful man likely to oppose Richard, was executed.

Buckingham made a speech to the London mob, declaring Edward V to be illegitimate, and urging them to accept Richard as their king. A meeting of Lords and Commons accepted this assertion, and, on 26th July 1483, the Duke of Gloucester became King Richard III.

Richard proved to be an able king. He governed as Edward IV had done, through his 'household' offices such as the Treasury and Chamber, avoiding the 'baronial' offices of Exchequer and Chancery. He was never an unpopular king, and his death caused grief throughout the north.

But his short reign knew no peace. The Duke of Buckingham immediately went into revolt for an obscure personal reason, with the object of installing the Earl of Richmond (the future Henry VII – see family tree, page 1921). The revolt was crushed, but Henry soon tried again, this time as his own leader.

End of the Yorkists

With a small force Henry marched into the Midlands. Richard met him with a much larger army, but, in the middle of the battle that ensued, much of that army deserted. On the field of Bosworth, 1485, the Yorkist cause was torn to ribbons. Richard himself was slain and the powerful House which had dominated England lay in ruins. The House of Tudor took over, its rivals having annihilated each other. The Yorkist rule had been brief; yet it was hardly worse than the disturbed reigns of the absent Henry V and the ineffectual Henry VI. In more ways than self-destruction they had prepared the way for the New Monarchy. Their strong hand had brought a respect for the crown which was to be translated into permanence for the next dynasty.

The death of the last of the Yorkist kings, Richard III, on the field at Bosworth, 1485

A view of the oil wells in Lake Maracaibo
A gaucho of the Argentine Pampas catching a calf with his lassoo
bananas
cotton
cocoa
oil refinery
coffee
petrol refining
petrol
rum
bauxite
Panama hats
leather
rubber
cinchona bark
brazil nuts
stock raising
timber
vicuna
llama
coal textiles
alpaca
vines
mineral industries
sea fishing
horse breeding
diamonds
Recife
naval and metallurgical industries
textiles
pineapple
Rio de Janeiro
banana
textile and metallurgical industries
tobacco industry
maize
furs
chemical industry
tinned beef
Valparaiso
Montevideo
Buenos Aires
potatoes
crustaceans
whale fishing
sugar cane
rice
jute
tobacco
silver
nickel
aluminium
lead
gold
platinum
bismuth
antimony
cobalt
tin
chromium
vanadium
copper
tungsten
iron
zinc
manganese
iodine
1924

SOUTH AMERICA

SOUTH AMERICA is inhabited by several distinct racial and cultural groups. The original Indian inhabitants still dominate the Amazon Basin and the high Andes. Europeans, mainly of Spanish and Portuguese descent who have arrived from the 16th century on, are least mixed with other blood in the south. Negroes were brought to work in the fields of parts of Colombia and Brazil, and there are many of them there today. All these groups have to some extent become mixed, so that racial types are extremely complex. Everywhere, population is growing rapidly, new lands are being cultivated, and new resources exploited. Economic development is much more rapid in Venezuela and the south than, for example, in the Brazilian jungles or the high Andes.

THE MAIN AGRICULTURAL REGIONS

A great variety of crops can be grown in South America. Its vast area means that various climates are experienced over its surface, and it is this variation in climate which accounts for the wide range of crops. The equatorial zone is still covered with dense jungle. Brazil nuts are gathered from trees growing in it, and at the margins of the forest the bark of the cinchona is collected, for use in the preparation of quinine. There are also rubber plantations, but the native agriculture is very primitive. Bananas and cocoa grow in an area with a similar climate in the extreme north of the west coast.

North and south of the equatorial zone lie the tropical areas which have a dry season. Coffee, sugar, tobacco, and cotton are the chief commercial crops, although cocoa and rice are grown near the coasts.

South of the tropical zone lies the temperate zone. This is divided into two by the Andes. To the east lies the relatively warm and wet area of north Argentina, Uruguay, and the extreme south of Brazil, and the cool dry region in the south known as Patagonia. The climate of Patagonia is unsuitable for growing crops, but the Pampas of Argentina is one of the most important food-producing areas in South America. Great quantities of maize and wheat are grown there. To the west of the Andes the temperate climates range from a Mediterranean type in central Chile, with fairly mild, wet winters and hot, dry summers, to the cool and very wet climate of the south. This means that the range of crops grown there is very wide. Wheat, grapes, and maize are the main crops in central Chile, while in the south, where the dense forest has been cleared, pasture predominates. In the extreme south bare rocks and snow-covered peaks are common.

There are two other regions of South America: the Andes, and the Atacama desert along the west coast. The Andes, because of their great height, have a much cooler climate than the surrounding lowlands, and the higher the mountains, the fewer the crops that can be grown; in Peru, for example, wheat, barley, and potatoes only can be grown over 12,000 feet. The desert along the west coast is fertile only where there is water. Commercial production is confined to oases which have a reliable source of water. Sugar cane and cotton are the main crops, though vegetables are grown near Lima.

DISTRIBUTION OF LIVESTOCK

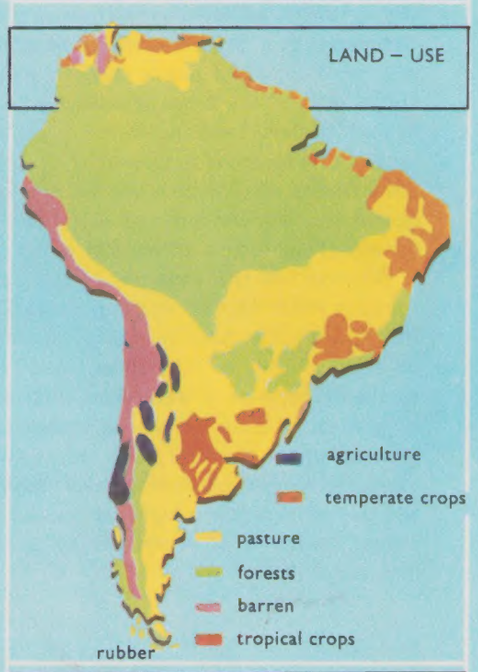
Most of the livestock of South America is kept in Brazil, Argentina, Venezuela, and Colombia. The export of meat from Argentina is second only to that of cereal crops. Brazil has the largest number of cattle, and 80 per cent of the pigs. Nearly half the sheep are in Argentina.

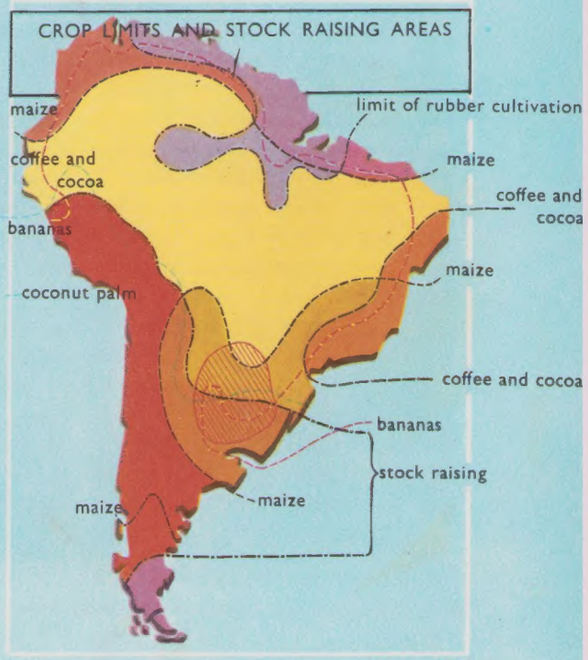
Altogether there are 160 million cattle, 125 million sheep, and 60 million pigs. The 3 million llamas and alpacas in South America live mainly in Peru.

INDUSTRY

South America is not one of the highly industrialised areas of the world. The lack of coal, essential to the production of iron and steel, has hindered the growth of heavy industry. Brazil produces just over four million tons of iron and steel each year, Argentina one million, and Chile and Peru even less. The production of consumer goods is the most important branch of industry, especially the making of textiles (this is typical of countries whose industrial development is just beginning).

Bolivia is the third largest producer of tin in the world and Chile is important for copper. Many minerals are known but barely worked; for example, there are iron ore and manganese in Paraguay. Brazil is one of the largest potential producers of hydro-electricity in the world, and Venezuela is the largest exporter of oil.





DEW AND FROST

A leaf covered with dew

THE air round about us always contains some water in the form of vapour. On 'close' or heavy days the amount of water in the air is high, but even on the hottest summer day the air is never completely dry. If you sit outside on a fine day in summer with an iced drink, you will notice that the glass soon becomes covered with a mist of tiny drops of water. In the same way the windows of your kitchen 'steam up' when it is cold outside and water from kettles or saucepans is saturating the air inside. These common observations show us that the water vapour in the air, which we cannot see, will condense on cold objects (like the glass and the windows) and form a visible film of water.

We have said that even on the hottest summer day the air still contains water vapour, and you may ask where this water comes from if there has been no rain. The answer is that near the sea, or near streams or lakes, the water vapour is formed largely by the evaporation of water from these sources. In places far from large areas of open water, the vapour is formed from the water given off by the leaves of plants, which the roots of the plants have extracted from deep underground. So long as the sun is shining, and the temperature is high, this vapour remains in the air and we cannot see it. If, however, the air is cooled, the vapour turns into water again.

THE FORMATION OF DEW

On a clear night in late spring, summer, or early autumn, the earth, which has been warmed by the sun during the day, loses heat by *radiation* (see page 1232). With no clouds to act as a blanket and keep the heat in, the earth's surface cools very quickly and a layer of air near the ground cools with it. The water vapour which was held in the air while it was warm during the day now condenses from this thin, cold layer of air, and forms drops of water on the ground or on the vegetation near the ground. This deposit of water is called dew.

In the height of summer the dew soon evaporates when the sun rises, so you have to get up very early to see it. In the spring and autumn the dew will lie on the grass until quite late in the morning.

In the desert areas of the world, where the rainfall is very low, the dew provides enough moisture to enable desert plants to survive from one fall of rain to the next.

FROST

If the temperature of the ground falls at night to below freezing point, one of two things can happen. Either dew which has already been formed will freeze to form ice, or, if the temperature falls very rapidly to below freezing point, no liquid water will be deposited at all, and the vapour in the air will turn directly into tiny crystals of ice. This is sometimes called *hoar frost*.

Ground frost coats only low-growing vegetation with ice

In spring and autumn the nights, although cold, are comparatively short. The radiation of heat from the earth during the night is only enough to cool the ground itself, and a very thin layer of air, to below freezing point. Frost only forms under these conditions on the ground itself and on very low-growing vegetation. This type of frost is called *ground frost*. During the winter, when nights are longer, and temperatures in general are lower, large masses of air may be cooled to below freezing point, and these may cover the earth to a considerable height. In this case frost will form on objects high up, such as telephone wires and trees, as well as on the ground. This type of frost is called *air frost*.

Although the air may be very cold in winter, the ground in this country is very seldom frozen to a depth of more than a few inches, because the soil is a very good insulator. In really cold climates, such as that of northern Canada or Siberia, the ground becomes permanently frozen to a depth of many feet. Because soil is a good insulator it protects the roots of perennial plants from damage by frost in the winter.

Air frost covers low-growing vegetation, trees, and telephone wires with ice, often forming long fern-like crystals

THE EFFECTS OF FROST

Frost can be both harmful and beneficial to the farmer and gardener. Frost in spring may cause severe damage to the tender shoots of new plants, and in the case of sensitive crops like potatoes a late frost can ruin the crop. Air frosts in spring can kill the blossom buds of fruit trees. On the other hand, frost in the winter helps to improve the soil by breaking it up after ploughing. In both cases the frost works in the same way. Water in the plants or in the soil freezes and expands. In plants this bursts the cells and kills them, while in the soil it splits the lumps.

THE DEVELOPMENT OF AEROPLANES

FROM GREAT BRITAIN TO U S A BY JET

TIME IN LONDON		TIME IN U S A
12.00 noon (Friday)	dep. London	04.00 (Friday)
22.15	arr. Seattle	14.15
23.30	dep. Seattle	15.30
00.10 (Saturday)	arr. Portland	16.10
00.35	dep. Portland	16.35
02.00	arr. San Francisco	18.00
19.30	dep. San Francisco	11.30 (Saturday)
07.00	arr. London	23.00

In the above cities of U S A the time is 8 hours behind the time in Britain – so the time in both countries has been given in each case.

IMAGINE the surprise of a man living 60 years ago if he could have seen this remarkable timetable for a flight from Britain to the United States of America. Leaving London at noon, the aeroplane arrives at Seattle only $10\frac{1}{4}$ hours later, before continuing to Portland and San Francisco. Half a century ago, when even a short seaside trip was a tremendous undertaking, such an achievement would have seemed unbelievable. We too should be amazed, but we are so used to such speeds nowadays that we take it quite for granted.

The rate of progress in aviation is very rapid, and one can almost say that something new is discovered from month to month. This is due to the ingenious work of aeronautical technicians, to the courage of pilots, and to the invention of stronger materials to withstand the stresses to which powerful aeroplanes are subjected during flight.

THE MOST IMPORTANT STAGES IN THE PROGRESS OF AVIATION

The flight in 1783 of Pilâtre de Rozier and the Marquis d'Arlandes in a balloon filled with hot air was the first undertaken by man in a 'lighter-than-air' craft. It was followed the next month by the first hydrogen balloon voyage by Charles and Robert (see page 762). The hot-air balloon flew over Paris, reaching a height of 3,000 feet, and landed after 25 minutes in the air. Flight in 'lighter-than-air' craft has continued for over 100 years, both in balloons, and later in constantly improving airships.

The brothers Wilbur and Orville Wright mastered the art of gliding before pioneering the powered aeroplane.

The world's first powered, sustained and controlled flight was made in this aircraft by the Wright brothers in 1903

On 17th December 1903 they made four flights in their powered aeroplane, which were the first in history. They flew at a speed of about 30 m p h, and in their most successful flight covered about half a mile (air distance) in 59 seconds. The Wright brothers led the world in aviation until 1909.

The 1909 *Blériot No. XI – the first aircraft to fly the Channel*

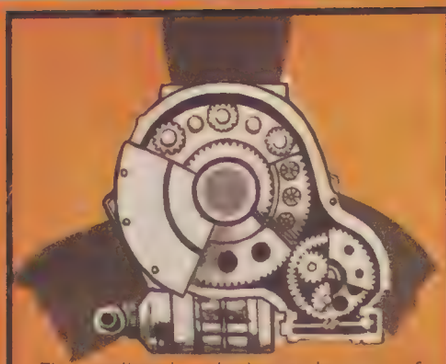
It was in 1909 that the Frenchman Louis Blériot succeeded in crossing the Channel in an aeroplane he had designed himself, the Blériot No. XI. This aircraft was powered by an engine built by an Italian named Anzani. Blériot's flight, which was made without the aid of a compass, made the world conscious of the possibilities – and dangers – of the aeroplane, and forced governments to consider establishing armed air forces. Long before flight had been achieved, the 18th-century writer Dr Johnson was able to imagine its possible menace to mankind, and in his book *Rasselas* dramatically states: 'Against an army sailing through the clouds neither walls, nor mountains, nor seas, could afford any security.'

1911. The first practical seaplane was built by a man named Glenn Curtiss in the United States of America.

1915. A German named Hugo Junkers introduced the first all-metal cantilever monoplane (single wings fixed firmly on both sides of fuselage, or body, which supports the wings without other aids).

1919. Hugo Junkers built the first small version of the modern airliner.

1919. An Englishman named Handley Page patented his invention of 'slots' (gaps between the wing and specially formed slats) which preserve the lift of the aircraft, and make it easier to land at slow speeds.



The complicated mechanism at the centre of a variable pitch propeller

From 1932 to 1935, variable pitch and constant speed propellers were introduced, inventions which allowed the propeller to give the best thrust possible for all conditions of flying, from take-off to landing. The pilot could now vary the pitch of the propeller – that is, he could set its blades at different angles. In later aircraft he could put the propeller into neutral if the engine stopped, by turning the blades to a position giving the least resistance to the forward passage of the plane. Later still, 'reversible pitch' was developed, used during landing as a brake on the aircraft.

1919. First non-stop Atlantic aeroplane crossing by Alcock and Brown.

1920's. Application of the retractable undercarriage, with consequent increase in speed.

1927. The American Charles Lindbergh made the first solo transatlantic flight – 3,600 miles in 33 hours 29 minutes 30 seconds.

1935. The American Douglas Company introduced the DC-3 (the Dakota), a twin-engined plane carrying 20 passengers. This has been the most successful transport plane.

1941. The first British jet-propelled aeroplane, the experimental E.28/39, with a Whittle engine.

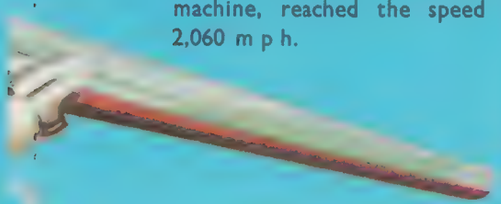
1943–1946. The four-engined passenger plane was perfected in America, making possible the setting up of regular transcontinental and transoceanic airlines. The picture shows the DC-4, which has the following features: it carries 42 passengers, has a wing span of 117½ feet, and a cruising speed of 200 m p h.

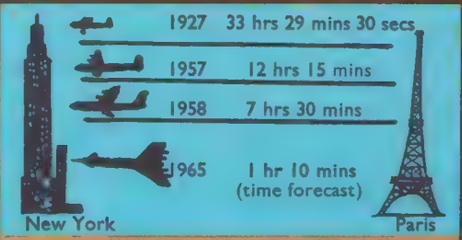
1947. The American Charles Yaeger, flying the Bell X-1, exceeded the speed of sound at 1,006 m p h.

1952. The de Havilland Company's Comet I was the first passenger aircraft with jet engines to go into service. It had a speed of 450 m p h.

1965. By this date there will be even more powerful passenger aircraft. They may be shaped like gigantic arrows, and will fly at speeds of 2,000 m p h, about three times the speed of sound. But the speed race is not over, and a 6 Mach aircraft is already planned – one which can fly at six times the speed of sound at sea level (760 m p h) which is called Mach 1.

1956. The American Frank Everest, flying a Bell X-2, a rocket-engined machine, reached the speed of 2,060 m p h.





Time taken at different periods to fly the Atlantic

1958. Huge passenger jets were put into service on the intercontinental routes. The largest were the Boeing 707 and the Douglas DC-8. The main characteristics of these planes were as follows: passengers carried – 130 to 160; cruising speed – close to 600 m p h; four Rolls-Royce jet engines, which develop a thrust of 15,800 lb, each of them using 500 gallons of fuel per hour of flight.

AIR TRAFFIC

The volume of aircraft traffic in the air today has increased enormously since the Second World War. As aeroplanes have been developed to carry more and more passengers with ever greater safety, so the airlines have expanded, and have also been extensively reorganised. Throughout the world today there are almost 20,000 aircraft flying at every moment of the day, and nearly half a million people daily make use of this modern means of transport. Control of the vast air traffic is organised with precise care, by a variety of methods. Aircraft are navigated along the air routes of the world by landmarks on the earth, by the position of the sun, moon, and stars, and by radio and radar aids. Near airports, aircraft are controlled from a building known as the control tower.

JOHN BUNYAN

THE Pilgrim's Progress, the work which has made John Bunyan famous, is one of the most exciting stories in the English language; it tells the story of a man's endeavours to save his soul. What kind of man was Bunyan, that he could make so serious a subject stir the imagination of readers young and old?

Son of a tinker

Bunyan, who was born at Elstow near Bedford in 1628, was the son of a tinker, and was himself brought up to learn his father's trade of mending pots and pans. The Bunyan family was quite poor, and John was sent to school, as he tells us, 'according to the rate of other poor men's children'. But he was taught to read and write, and at that time this was a rare achievement for so poor a family.

Bunyan took part in the village and country life to the full, joining in local games and sports, visiting the Elstow fairs, and exploring the village and countryside with his younger sister. But his imagination was unusual, and from the age of nine or ten he had 'fearful dreams' and 'dreadful visions', which troubled him until he was a young man. At the age of 58 he wrote a poem called *The Awakened Child's Lamentation*, in which there is a verse describing his awaking from a childhood nightmare:

As sin hath me infected,
I am thereof detected:
Mercy I have neglected,
I fear I am rejected.

Bunyan was hardly affected by the unrest and civil war between King Charles I and Parliament (see page 356), until he was conscripted into the Parliamentary army in 1645. He served for three years, and then returned to his native village. There, two or three years later, he married a woman as poor as he was, and whose only dowry was two religious books of her father's. They were happy together, and read the books, which he says later 'did beget within me some desires to Religion'.

Christian comes to the cross in The Pilgrim's Progress *and is eased of the burden of his sins*

Visions and conflict

In reading one of these books, Bunyan found himself drawn to the 'Meditations of a man not reconciled by God in Christ when he faces death'. This, and the line in his poem already quoted: 'I fear I am rejected', suggest his deep conscience, which, together with his unusually powerful imagination, help us to understand the visions to which he was sometimes subject. He feared that to play on a Sunday, for example, was a sin, and one Sunday during a game on the village green he heard a voice: 'Wilt thou leave thy sins and go to Heaven; or have thy sins, and go to Hell?' Looking up, he seemed to see the face of Jesus looking down upon him.

A cure from his terrible spiritual fears seems to have begun when he overheard two or three women in Bedford talking of 'a new birth, the work of God on their hearts'. They were members of the congregation of John Gifford, pastor of a small Puritan community. Bunyan was received into the community in 1653, but it was some time before he was freed of the questions burning his mind. His simple background had not given him the education to answer the questions, and his learning had to be almost entirely based on the Bible. 'I began to look into the Bible with new eyes, and read as I never did before.'

Preaching and imprisonment

As Bunyan overcame his struggles to understand his spiritual problems, he wished to pass on his knowledge to other people. Here there was no gulf for him to cross, for he had a deep understanding of humanity; he knew the hopes and fears by which people are troubled. About 1655 he began to preach with zeal and sincerity. But in a country which had long been torn by religious controversy between Protestants and Roman Catholics, independent preaching was feared by the authorities. In 1660 he was arrested; he refused to agree not to preach publicly again, and was sent to prison for three months. Apart from a short period in 1666, he stayed in prison for over ten years.

John Bunyan (1628–1688), *famous as a writer and as a preacher*

By the time of his release in 1672, John Gifford had died. Bunyan was elected pastor of his community, and got a licence to preach. In 1675 such licences were revoked, and he was imprisoned again for nearly two years in Bedford town gaol (where he wrote the first part of *The Pilgrim's Progress*). In 1685 Bunyan was one of the most noted nonconformist preachers in England, and used to visit London where he always attracted large congregations.

John Bunyan the writer

Bunyan's written works have earned him fame in the history of English literature, but his own desire was not for creative success; he wanted to help people to save their souls. His chief works were *Grace Abounding to the Chief of Sinners* (an inspiring account of his own experiences), 1666; *The Pilgrim's Progress* (first part), 1678; *Life and Death of Mr Badman*, 1680; *The Holy War*, 1682; *The Pilgrim's Progress* (part two), 1685; and *A Book for Boys and Girls* (in verse), 1686. He died in London on 31st August 1688.

BEETLES (part one)

The Coptolabrus beetle of the Far East has beautifully sculptured elytra. It is allied to the British Carabus

ABOUT 250,000 different species of beetles are known and many hundreds more are discovered and described every year. The Order to which they belong, the *Coleoptera*, is by far the largest Order of insects; in fact no other Order of the animal kingdom contains so many species. In Britain about 3,700 kinds of beetles are known.

Although none of them live in the sea, beetles are found in every possible habitat on the land except the permanently frozen polar regions and higher mountain tops. On land they are found on the surface of the ground and burrowing beneath it or living in dark caves. They live and feed on plants from ground level to the top of high trees, and if nets are towed behind aeroplanes, they catch plenty of flying beetles. Many beetles are less than a millimetre in length and a microscope is needed to study them, while the bulky Goliath beetle, five inches long, is the largest of all insects.

Many kinds of beetles are serious enemies of man, not because they spread disease or attack our comfort (as mosquitoes and flies do) but because they destroy foodstuffs, both growing and stored, and other essential materials. An example of the former is the Colorado beetle, which may devastate growing crops of potatoes by eating the green parts of the plant. The timbers of old buildings are often threatened by the destructive burrowing of the deathwatch beetle.

WHY THEY ARE CALLED COLEOPTERA

The names of most insect Orders end with the term '-ptera', from the Greek word *pteron*, a wing. Insects are classified largely by reference to how their wings are formed, and the word Coleoptera means 'sheath-winged'.

In all ordinary beetles there is one pair of thin, membranous wings which, when not in use, are covered and protected by a pair of horny sheaths, called the *elytra*. These correspond to the fore-wings of other insects, the beetles' flying pair being the hind wings. There are, however, abnormal beetles which are wingless.

The elytra are made of the substance called *chitin*, which, in a thicker or thinner layer, forms the body-covering of all insects.

THE BITING MOUTHPARTS

Insects feed in one of two ways (see page 1007) – by chewing or by sucking. In beetles the mouthparts are of the chewing type, though they differ from human jaws in that they work from side to side, and not up and down.

The diagram on the right shows the different parts that go to make up the biting and chewing apparatus of a beetle. The most powerful of them are the jaws or *mandibles*, which are shown in red. These are used for seizing the prey (in carnivorous beetles) and generally for holding and breaking up the food. Below and behind them is another pair of jaws, the *maxillae*. These carry jointed organs of touch, the *palps*, and are used to break up the food still more and guide it into the mouth. Above and below the mouth there is an upper and a lower lip. The upper one (coloured red) is a simple structure called the *labrum*, but the lower lip, or *labium*, is more complicated, and carries palps, something like those on the maxillae.

Diagram of the mouth-parts of a beetle

LIFE-HISTORY OF A BEETLE: THE DIVING BEETLE

Complete metamorphosis

In its life-history a beetle goes through what is known as complete metamorphosis. That is to say, during its lifetime it passes successively through four distinct forms: egg, larva, pupa, and *imago* or perfect insect. In this it is like the butterflies, bees, and flies, but unlike cockroaches, grasshoppers, and bugs (Hemiptera), which grow up gradually.

Many beetle larvae live underground, while others live in water (like the larva of the diving beetle, which is shown in the illustration above), and many feed on various parts of plants.

TWO SUBORDERS

In classifying the beetles we can first divide them into two suborders: the Adephaga and the Polyphaga. Adephaga is derived from a Greek word meaning 'ravenous', and most of the beetles included in this suborder are carnivorous. The Polyphaga (from the Greek *poly*, many, and *phagein*, eat) live on a wide variety of food, though each species generally has its own preference. Some are carnivorous, many feed on plants (often on some particular group or species of plants), and others on fungi, decaying wood, and other unlikely sources of nourishment.

In this article we deal with the Adephaga.

THE ADEPHAGA

The beetles that make up this suborder live in various surroundings. Some run about on the ground, or among the leaves and branches of trees. Nearly all of them are carnivorous, and they certainly help to control the numbers of caterpillars and other creatures which feed on plants, often on those which we cultivate for food. Many of the Adephaga live in water and are adapted for swimming and breathing there, like the diving beetle. Most of them pass their time below the surface, but the little whirligig beetles skate on the surface film.

GREEN CALOSOMA (*Calosoma sycophanta*) This beautiful beetle, quite common on the European continent, is occasionally found in south-eastern England. Its favourite food is the larvae of moths, and it undoubtedly helps to keep down the numbers of caterpillars that destroy the foliage of trees. Many of these beetles have been sent to America to help keep down the caterpillars of certain moths – for instance, the gypsy moth – that were accidentally introduced from Europe.

BOMBARDIER BEETLE (*Brachinus crepitans*) This little beetle, about a quarter of an inch long, has a most extraordinary method of defending itself. It has a gland in its abdomen containing a liquid that evaporates very quickly. This can be shot out in the face of a pursuing enemy in the form of a minute explosion, which a human can actually hear; as it is corrosive, it has the effect of a discharge of tear-gas, and it can be repeated several times. This beetle is not uncommon in chalky districts in southern England.

BEAKED CYCHRUS (*Cychrus cylindricollis*) This is a rare beetle, found in the Italian Alps. It preys mainly on snails, and its head and thorax are elongated so that it can penetrate right into their shells. There is an allied British species, *Cychrus caraboides*, which is rather similar in appearance.

SAND BEETLE (*Eurynebria complanata*) This species is found on sandy shores in the south-west of England and South Wales.

VIOLET GROUND BEETLE (*Carabus violaceus*) This handsome blackish-purple species is very common in woods. It feeds mainly on the larvae of other insects.

SPANISH CARAB (*Chrysocarabus hispanus*) A rare and very beautiful species, apparently found only in central France. Its name 'hispanus' (Spanish) is founded on an error.

The beetles on these pages are not drawn to the same scale

WHIRLIGIG BEETLE (*Gyrinus*) There are several common species of these little beetles, difficult to distinguish from each other. Many of them can be seen together skating rapidly over the surface of ponds and streams. Although they spend most of their time on the surface film of the water, they can dive and also fly very well. Each eye is divided into an upper and lower part, and it is thought that these are for seeing above and below the water respectively.

TIGER BEETLE (*Cicindela campestris*) In woods with sandy soil you can often see this handsome beetle running and flying about with such speed that your eye can hardly follow it. Its large, toothed mandibles and well-developed eyes show that it is a hunter, and its name, tiger beetle, suits it very well, for it feeds entirely on other insects. Its larva is a most curious creature. It makes a vertical burrow in sandy soil, the opening of which it closes with its large flat head. Any insect which unwarily walks over its head is seized and devoured.

SMALL WATER BEETLES (*Haliplus*) There are several common species of these little beetles, very difficult to distinguish from each other. They are not carnivorous, but feed on the tiny water plants called *algae*.

BLACK CORN BEETLE (*Zabrus tenebrioides*) This is one of the very few Adephaga which are not carnivorous. It feeds on the leaves of wheat and other cereals; fortunately it is rare in England and is found only in the south-east.

GREAT DIVING BEETLE (*Dytiscus marginalis*) This is one of our largest beetles, and lives in the water, swimming below the surface. It breathes by coming to the surface and taking in air through the tip of its abdomen. Both the beetle and its larva are fiercely carnivorous, preying on other insects, tadpoles, small fish, and so on, so beware of putting them into your aquarium.

ANT BEETLE (*Paussus favieri*) There are several species of beetles which live only in ants' nests, and this is one of them. It is found in the countries bordering the Mediterranean.

THOMAS GAINSBOROUGH

The Painter's Children Chasing a Butterfly (about 1754; National Gallery, London)

WHEN we think of painting in 16th- and 17th-century England, the names that come to mind are Holbein, Van Dyck, Lely, and Kneller. These certainly were painters who spent many years in England and enjoyed English patronage, but not one of them was of English nationality. It was not until the 18th century that English painting came into its own with a national character, created by English artists born and bred on English soil. The three great painters of the 18th century in England were William Hogarth, Sir Joshua Reynolds, and Thomas Gainsborough, of whom Gainsborough was the youngest.

Early life in Suffolk

Gainsborough was born in Sudbury, Suffolk, and it was here that he developed his intense love of nature and the Suffolk countryside. Unlike his contemporaries, Gainsborough had little training in art; he appears to have been a natural painter, and to have taught himself through observation of life around him. In spite of the Grand Tour and the Italian cult of his day, Gainsborough did not travel abroad. As a result, his approach to painting was original and unaffected. Although the majority of Gainsborough's works are portraits, he preferred painting landscapes. One of his earliest paintings is *Cornard Wood*, of which the artist himself wrote: 'It is in some respects a little in the Schoolboy Stile, but I do not reflect on this without secret gratification, for as an early instance how strong my inclination stood for Landskip, this picture was actually painted at Sudbury before I left school; – and was the means of my father sending me to London.'

The sad fact is that portraits were in great demand, whereas there was little sale for landscape paintings of the English countryside. In order to support his wife and two children, Gainsborough was compelled to paint portraits.

Early portraits

Gainsborough's early portraits were unusual for their time in that the sitters were posed against landscape backgrounds in the open air, instead of the more usual draped curtain or architectural setting. The portrait of Mr and Mrs Robert Andrews (about 1748) shows the newly married couple on a seat, not in some formal garden but by open fields where Mr Andrews has just shot a bird. There is almost as much of interest in the landscape setting as in the figures, and the humans and background are held together by strong sunlight effects.

The portrait *The Painter's Children Chasing a Butterfly* (about 1754) is one of the most charming pictures ever painted of children. It has an amazing freshness and originality, not only in the approach to the subject-matter but also in the light, free handling of the paint that is a strong characteristic of Gainsborough's work.

Bath

In 1759 Gainsborough left Suffolk for Bath, probably hoping to obtain new requests from people who wanted their portraits to be painted, for Bath was a fashionable town and many wealthy people came there. Gainsborough's portraits of this period are more elegant in style, in keeping with his grander sitters, and the backgrounds are now romantic settings without the simplicity of his Suffolk paintings. A charming portrait of

Mrs Siddons (1785; National Gallery, London)

Mr and Mrs Robert Andrews (about 1748; National Gallery, London)

Mary, Countess of Howe
(1765; Kenwood House, London)

this period is that of Mary, Countess of Howe, which was painted in 1765. The background is an unrealistic landscape. Gainsborough's painting of the Countess's dress, with its contrasting materials, is particularly skilful.

The paintings by the 17th-century artist Van Dyck were a constant source of inspiration to Gainsborough, for Van Dyck's interest in dress and graceful poses helped Gainsborough with his more fashionable patrons. Though Gainsborough disliked posing his sitters in fancy dress, his famous *Blue Boy* (now in America) is in fact wearing Van Dyck cavalier costume.

London

Apart from painting, Gainsborough greatly enjoyed music and the theatre, and one of his sitters was the famous actor David Garrick whom he met at Bath. In London Gainsborough painted Mrs Siddons and another famous theatrical figure, Mrs Robinson, as Perdita in Shakespeare's play *A Winter's Tale* (about 1782). Mrs Robinson was much admired by the Prince of Wales, and in her hand she holds a miniature of the Royal figure. The dark trees set off her white, muslin-clad figure and her little white dog, while beyond is a poetic landscape of soft greens.

By the time Gainsborough moved to London, in 1774, his prestige was growing. He bought a house in Pall Mall, employed a footman, and owned a coach. By 1783 Gainsborough was enjoying the patronage of the Royal family, who thought he achieved a better likeness than Reynolds, and soon Gainsborough was busily employed on the portraits of George III, Queen Charlotte, and their 13 children at Windsor.

Landscapes

In spite of these successes Gainsborough once complained to a friend: 'I'm sick of portraits and wish very much to take my viola da gamba and walk off to some sweet village where I can paint Landskips.'

Gainsborough's early landscape paintings show the influence of certain Dutch realistic painters of the 17th century, such as Ruisdael and Hobbema. The realism of his early painting *Cornard Wood*, for example, is typical of their approach to painting countryside. A later landscape, *The Harvest Waggon* (about 1767), of the Bath period, shows a more romantic, imaginative approach; it is less a direct recording of nature. There is a new warmth of colour and liveliness of brushwork that reminds us of Rubens, and, as always, there is Gainsborough's wonderful treatment of sunlight. *Going to Market* (1770's) shows a lively country scene with an informal group of figures, and the picture is beautifully composed and balanced.

Gainsborough's view of country life is not one of dismal poverty and labour but of gay scenes set in sunlit countryside.

The Morning Walk
(1785; National Gallery, London)

Later landscapes

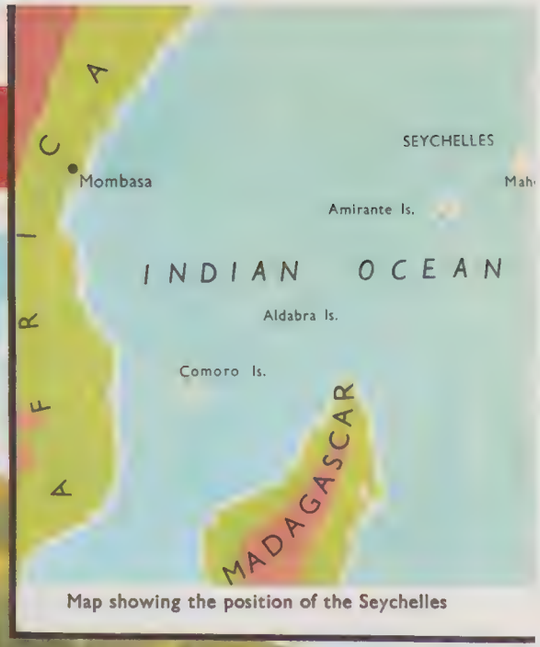
The artist's later landscapes create a mood rather than describe with topographical accuracy. Most of the landscapes have extremely vague titles – they are not specific places but aspects of nature picked out to create a pleasing composition of generalised forms, and show rolling clouds, feathery trees, and winding lanes. Gainsborough used to paint his landscapes by candlelight, working from models made of lichen, sand, and leaves, concerned with romantic effects rather than tiny details, and trying to create a picturesque scene of balance and harmony.

One of Gainsborough's last and best-known works is the *Market Cart* (about 1786). This seems to sum up his love for the English countryside, which is the basis of the English landscape tradition in painting, and which was to inspire Constable in the 19th century.

Going to Market
(1770's; Kenwood House, London)

Market Cart
(about 1786; Tate Gallery, London)

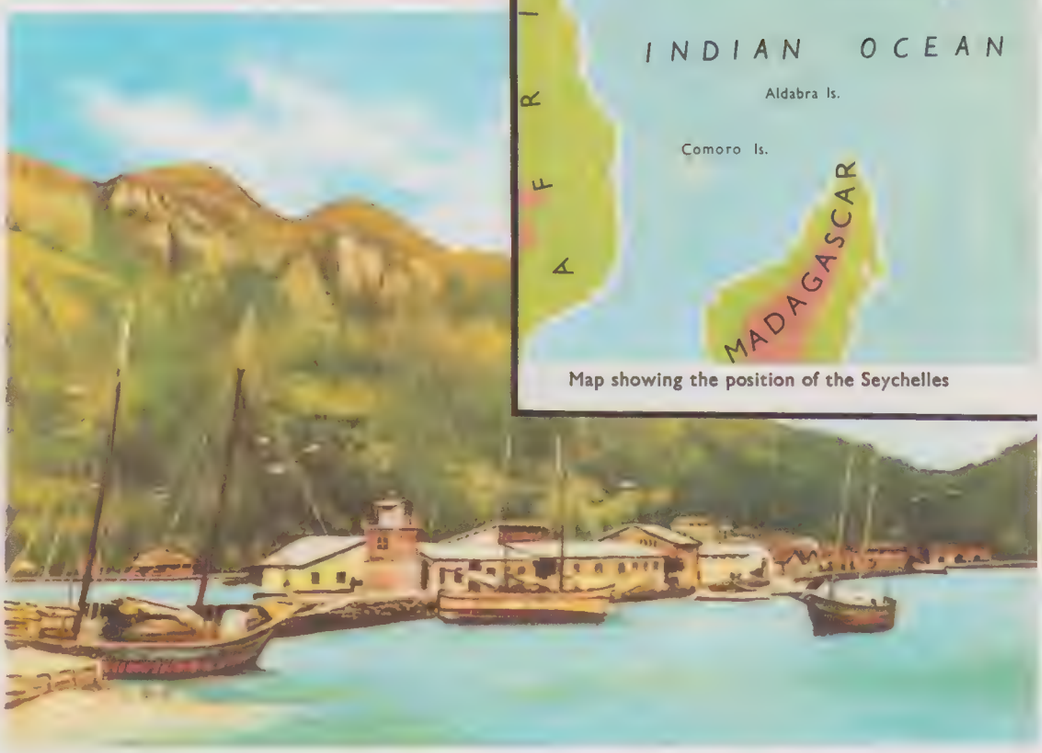
THE SEYCHELLES



Map showing the position of the Seychelles

THE Seychelles archipelago, the Amirante Isles, the Cosmoledo group, the Aldabra Islands, and a few other tiny islands form the British Colony of Seychelles which is situated in the Indian Ocean.

Its 92 islands have a total area of 156¼ square miles and a population of 41,425. About 81 per cent of this population live on Mahé, the largest island. This is not surprising, since Victoria, the capital and main port of the Seychelles, lies on the north-east side of this island. Victoria is at the head of an excellent harbour, three miles wide, and is a fascinating town of narrow streets and bazaars. Many of the houses are built of massive coral blocks which at a distance glisten like marble.



The long pier at Port Victoria on Mahé

A brief history

The Seychelles were first discovered in 1505 by a Portuguese navigator, Mascarenhas. At that time the islands were uninhabited, and they remained so for the next 263 years. In 1742 Captain Lazare Picault annexed the islands to France, and in 1768 the first French settlers started spice plantations to compete with the Dutch monopoly of the spice trade elsewhere.

In 1794 the French governor of Seychelles, Jean Baptiste Quéau de Quincy, surrendered to British warships that had anchored in Victoria harbour in order to land French prisoners. As soon as the warships had left Victoria, he raised the French flag once more and continued to govern the Seychelles for France! This happened time after time. Quéau de Quincy capitulated (surrendered) seven times in all to seven different British ships. He flew whatever flag was necessary (either the Union Jack or the French tricolour) to keep his people immune from French or English hostility.

Drying fish in the sun on specially built tables

However, Quéau de Quincy was considered a wise and capable man by the British authorities, and in 1814, when Seychelles, together with its dependencies, became a British possession under the Treaty of Paris, he was made First Civil Agent, Commandant, and Judge under British rule.

Until 1872 Seychelles and Mauritius were administered as a single colony, but a series of changes in the 19th century gave the Seychelles greater local authority, and in 1903 they became a separate Crown Colony.

Agriculture and industry

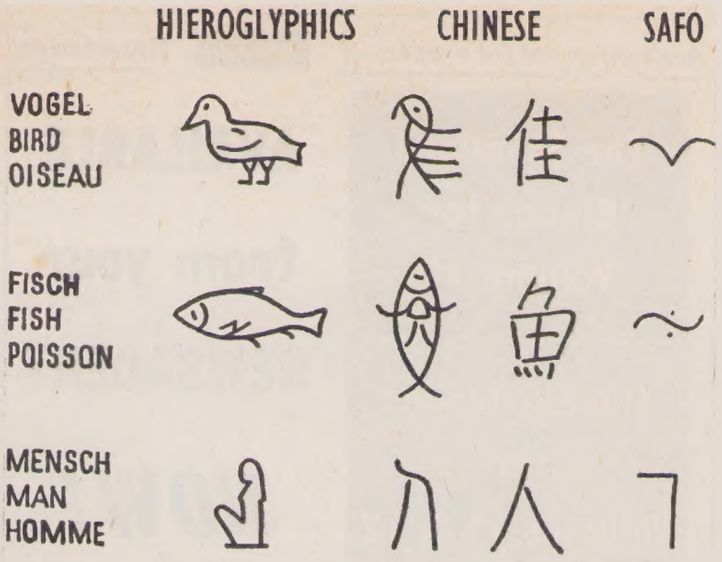
The Seychelles have never been considered particularly significant, either industrially or agriculturally. A British commander wrote: 'Seychelles is only kept for its geographical position.' However, one-third of the adult population in Seychelles is engaged in agriculture and *silviculture* (the growing of trees).

About one-third of the acreage of the colony is unproductive, with outcrops of eroded granite, and coral reefs still where they were originally formed. About 3,500 acres of land are under forest, and one-quarter of this is cultivated. Copra (dried kernels of coconut) is the most important export; others are: cinnamon leaf oil, patchouli oil (a fixative for the more heavy types of perfume), salted fish, tortoise and green turtle shells, and phosphatic guano (a fertiliser made from sea-bird droppings). Cassava (from which flour is obtained), yams, sweet potatoes, and plantain (the seeds of which are used for bird seed) are grown in large quantities.

The people

The people of the Seychelles have a highly varied collection of ancestors. The original settlers were French, but they brought with them a great number of African slaves. By the time slavery was abolished in 1835, these slaves outnumbered the Europeans by 12 to 1. However, it is not only French and African blood that go to make up the modern Seychellois. English, Chinese, Indians, crews of visiting ships, exiles, visitors – all have played some part in the make-up of the Seychelles inhabitants.

In spite of this, the Seychellois have somehow managed to fuse into a distinct people, though very much influenced by French culture, language, outlook, and religion (which is predominantly Roman Catholic). The Seychellois are planning to develop tourism with the help of British grants, as their islands are among the most beautiful in the world.



This is how three common words, bird, fish and man, are expressed in Ancient Egyptian hieroglyphics (left column), Chinese (two centre columns), and Safo (right column).

Professor Andre Eckardt, a 77-year-old German historian, holds a Chinese screen which demonstrates how pictures can be made to represent words.

A NEW LANGUAGE

ENGLISH and French are perhaps the most widely used 'second languages' in the world – that means if two people of different nationalities meet, and neither understands the other's language, they might either talk English or French.

However, English and French are by no means universally known, and, anyway, a Nicaraguan might have great difficulty in making a Swede understand his French, so greatly does pronunciation differ.

Thus there is a definite need for a language which everyone will be able to understand and pronounce. The attempts to make Sanskrit into such a 'lingua franca' have not so far been successful.

Recently, a German history professor, Andre Eckardt, invented an artificial language which he hopes will come to have a limited use throughout the world.

This is not primarily a spoken language, but based on signs and symbols – not on words, as is our language. Professor Eckardt got the idea of a language based on signs and symbols from the study of Chinese, which is understood by about 800,000,000 people. He noticed, for instance, that the word for Peking is pronounced differently in Korean, Japanese and Chinese, but has the same symbol in all these languages.

He has thus invented a language based on 180 simple symbols that can, with little effort, be universally understood. These symbols can be combined to make words; for example, the word 'singing' would be a combination of the symbols for music, mouth, and tongue. In addition, he has created special symbols for adjectives, pronouns and prepositions. The language is called Safo.

Although similar in principle to Chinese, in the use of signs, it has none of the grammatical peculiarities of Chinese. It can be understood by European and Chinaman alike – a Chinaman could not quickly learn an artificial language based on the European alphabet, because the European alphabet is based on the Roman and Greek alphabets, largely unknown in the East.

Professor Eckardt is producing a dictionary of Safo which will contain 5,000 words. As the average Britisher understands about 20,000 words, and there are 400,000 in our language, Safo will not be able to express any great shades of meaning. However, Professor Eckardt thinks that it could be extremely useful in a limited way. It could, for instance, be used for signs and directions in towns visited by people of different nationalities, or at airports and international stations.

EXISTENCE	
MAN (human being)	
MAN	
WOMAN	
FATHER	
MOTHER	
BOY	
GIRL	
BIRTH	
DEATH	
HOUSE	
CHILD	
MOUTH	
MUSIC	
HEART	
BIRD	
WORK	
TONGUE	
SINGING	

Die Sinnschrift ist *die* Brücke zu allen Sprachen der Erde

*L'*ecriture symbolique est *le* pont pour toutes langues du monde

The symbolical writing is *the* bridge to all languages of the world

Quite a complicated sentence constructed from the 180 symbols of Safo.

****

EMERGENCY SYSTEMS

Emergency systems were first installed in trains after a murder had been committed in a north London train in 1864. To begin with, many devices were tried. Perhaps the strangest was devised by two men, Le Keux and Wishart. Their idea was for a Roman candle firework to be fitted in every compartment so that it projected through the roof. This could be ignited by any passenger by the use of a striking device fitted to each candle.

Eventually a 'communication cord' was invented. When pulled, it operated a steam valve which either blew a whistle or rang a bell in the guard's van and the engine cab. This was later superseded by the present chain type which, when pulled, destroys the vacuum in the braking system, applies the brakes automatically, and indicates this on a dial in the driver's cab. Warning . . . don't you try it or you will be fined £5 – unless there is a genuine reason for doing so.

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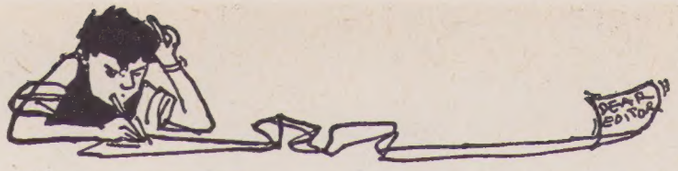


No More Letters Please

DEAR EDITOR—Please thank all those readers who wrote to me in answer to my letter about Yugoslavian pen-friends. I now have more than enough names and would be grateful if no more people wrote to me about this.

Maureen Herbert,
48 Brent Close,
Dartford, Kent.

Funny Favourite

DEAR EDITOR—You recently asked for our views on Lewis Carroll's brand of humour. I have always thought his books very funny. When my mother first read *Alice Through the Looking Glass* to me, I was seven, and we both laughed until we cried. But my brothers, who enjoyed both *Alice* books as stories, never saw the jokes at all.

Later on, I read the stories to myself, over and over again until I knew them almost off by heart. I also enjoy his nonsense verse very much.

The special kind of humour in *Alice* is word-humour – playing with words. If you do not know the different meanings and uses of words, the whole point of a lot of the jokes can be missed. For instance, there is the Dodo's 'Caucus-race', where all the animals run round in circles and never get anywhere. I never knew that a 'caucus' was a meeting of a political party to discuss future policies, and so I missed the joke completely.

Jane Terry,
4 North Row,
Warminster, Wilts.

For Easy Reference

DEAR EDITOR—There is an improvement I would like to suggest in the indexing arrangements.

At present, after looking up a subject in the cumulative index, one probably has to take down two or three volumes before hitting on the right page.

This difficulty could be overcome by printing the volume number as well as the page number after each reference in the index. Alternatively, you could print the page numbers included in each volume at the beginning of the contents and index sheets.

Either of these could be adopted for the benefit of faithful readers.

T. F. Davey,
155 Wellsway,
Bath.

You will be pleased to know that volume numbers, as well as page numbers, will be given in the final index.—Editor.

Memorable Journey

DEAR EDITOR—Last May 25 boys from my school went on holiday to Stavanger in Norway. After a journey by train and ship that took nearly a whole day, we were met by the Mayor of Stavanger. We stayed at the Mosvangan Youth Hostel which is built of wood and surrounded by trees. It stands near a large lake with an island in the middle.

On our first day in Norway, we went to Holtaheia for the unveiling of the memorial to the boys and teachers who lost their lives in the plane accident the year before. The unveiling was carried out on the top of the mountain with a short service, the music being provided by the Tau School band.

Our week was filled with trips and expeditions. One day we went along the Lysefjord, and saw water plunging down the mountainside. Here there is a rock one mile high, called the Pulpit Rock, which towered above us with the top covered in mist. The city of Stavanger entertained us to lunch at an hotel after this journey.

17th May is a national holiday in Norway and no one goes to work. On this day we were up early to find all the streets decorated with flags. There were bands playing and processions all round the town, led by the local fire engine. After a break for lunch, the procession started again, joined by lorries carrying performing acrobats and actors playing different scenes. The Norwegian naval band joined in the celebrations too.

The last days of our holiday were spent at Prekestolen Mountain Lodge. The Lodge is surrounded by snow-clad mountains, just visible through the mist, and the fjord below looks like a blue snake curling through the green mat of trees. From the Lodge we made our last expedition – to the top of Pulpit Rock.

Fraser Balaam,
16 Harcourt Road,
Thornton Heath,
Surrey.

Can you answer these?

1. Australia, Australasia, Oceania – can you show the significance of these terms?
2. What is the capital of Australia and in what state is it found?
3. The 'mid-point' of Australia is said to be A..... S..... Can you give the complete name?
4. What is a *marsupial*?
5. Name the states and one 'territory' of Australia, and put these places in the correct state or territory: Adelaide, Brisbane, Darwin, Melbourne, Perth, Sydney?
6. About how far would a sea-crossing be from Australia to New Zealand: 20 miles, 120 miles, or 1,200 miles?
7. Where is Bondi Beach, and for what is it famous?
8. What is a 'joey'?
9. It used to be called Van Diemen's Land. What do we call it today?

ANSWERS

1. *Australasia includes Australia, New Zealand, New Guinea, and other island groups; Oceania includes Australasia and Polynesia, Melanesia and Micronesia.*
2. *Canberra, really in Australian Capital Territory which was carved out of New South Wales.*
3. *Alice Springs.*
4. *Animal with a pouch, such as the kangaroo.*
5. *Adelaide, South Australia; Brisbane, Queensland; Darwin, Northern Territory; Melbourne, Victoria; Perth, Western Australia; Sydney, New South Wales*
6. *About 1,200 miles.*
7. *Near Sydney, surfing.*
8. *A young kangaroo.*
9. *Tasmania.*

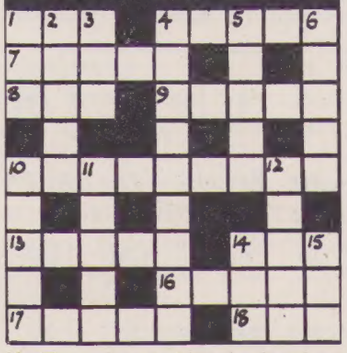
BRAIN ? BOX

1. THE ELGIN MARBLES – where will you find them? In the Giant's Causeway? At the British Museum? In the Parthenon at Athens? At Elgin in Morayshire? In the nave of St Giles's Cathedral, Edinburgh?
2. 'Think of a number,' said Dad to his 14-year-old son, 'and square it.'
   'Right, Dad. I've done that.'
   'Now take the next number above and square that. Now take your first square away from your second and tell me what the difference is.'
   'Forty-seven.'
   'Now I'll tell you what your two consecutive numbers were.'
   Can you?
3. 'Did you know,' said the laboratory wit, 'that my favourite fruit is composed of one part barium to two parts sodium, just that and nothing else?'
   No one could guess what he was driving at. Can you?

ANSWERS

1. *At the British Museum.*
2. *23 and 24. (The difference of the squares of two consecutive numbers always equals the sum of the numbers.)*
3. *He meant the BANANA. (The chemical symbols are Ba for barium, Na for sodium.)*

HIGH-SPEED CROSSWORD



Clues Across

1. Girl's name (2,000 less than madam) (3).
4. Stirrer of the fire (5).
7. Same as above (5).
8. The Jolly Miller's river (3).
9. This material is made from flax (5).
10. Join in partnership (9).
13. Shakespeare's was of a mid-summer night (5).
14. It guards the cricketer's leg (3).
16. Little girl who went through a looking-glass (5).
17. Adhesive substance obtained from trees (5).
18. Fresh (3).

Clues Down

1. Tot up (3).
2. Ways of eating (one historically was 'of Worms') (5).
3. Partook (of) (3).
4. Man in blue (9).
5. Country in Africa (5).
6. Washday anagram of 17 across (5).
10. Viper (5).
11. These need sowing (5).
12. Sign of something having been there (5).
14. Metal fastener (3).
15. Morning moisture (3).

Solution next week

SOLUTION TO LAST WEEK'S CROSSWORD

ACROSS: 1, Road signs; 5, Bowls; 7, Harp; 8, Ease; 9, Hove; 11, Deny; 12, Error; 13, Deterrent.

DOWN: 1, Right hand; 2, Drop; 3, Isle; 4, Safety net; 5, Brave; 6, Saner; 10, Erse; 11, Dour.

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upon by the state for military action. After the age of 30 he was wholly at the service of the state, which could use him as it wished.

Education in Athens

The purpose of education in Athens was very different. The Ancient Athenians did not restrict education to the military needs of the state, and they were more concerned with the development of the intellect than physical development. Broadly speaking, Athenian education was education for culture.

In Athens, unlike Sparta, the responsibility of educating a child fell upon the family. At the age of six or seven the Athenian boy began his scholastic life. He was attached to a tutor who was with him at all times, and who bore much of the responsibility for the development of the boy's character.

The Athenian boy would attend school for teaching in language, music, and gymnastics. The schools were neither state owned nor state controlled. The language master would teach the boy reading, writing, and some arithmetic. The boy would read the great poets and learn their works by heart.

In the school of music (so called because the disciplines which were under the protection of the Muses were studied there), lessons were held in history, the sciences, poetry, drama, singing, dancing, and music.

In the school of gymnastics, Athenian children practised the Pentathlon (from the Greek *pente*, five, and *athlia*, competition) – that is, jumping, running, wrestling, throwing the discus, and throwing the javelin.

The young Athenian continued his education until the age of 18, when he did two years of military training for the protection of his city. At the end of this time he became an Athenian citizen, and, after taking a vow of fidelity to the state, he was admitted to its political life.

Athenian education was certainly more balanced and more complete than that of Sparta. Spartan education has had little influence on later systems of education because it failed to recognise and respect the individual apart from the state.

Sparta and Athens made little provision for the education of women beyond their natural domestic requirements. Both forms of education were based upon the idea of a small group of well-educated people, while the rest of the population was made up of slaves or semi-slaves.

Education in Ancient Rome

The Ancient Romans believed that the strength of a state depended entirely upon the stability of the families that made it up. Therefore, the two institutions which were of greatest importance in Ancient Rome were the family and the state. The Romans were convinced that a child accustomed to respect and obey its parents would eventually become a citizen respecting the laws of the state. In education, then, the Romans looked upon the family as of the greatest importance. In fact, the chief educator of the Roman boy was the *pater familias* (head of the family), whose duty it was to teach the elementary standards of honest living to his sons. Great respect also was given to the mother of the family who helped considerably in the education of the sons.

This education, however, was possible only in a small community. As the Roman Empire expanded, the father, upon whom education depended, might well be away from home for long periods. Another form of education became necessary, and schools came into being.

The Ancient Athenians thought the development of the boys' intellects was the most important part of education

The schools

About the 3rd century B C elementary schools began to appear in Rome, where reading, writing, and counting were taught.

An elementary school in Ancient Rome, showing the master's cathedra

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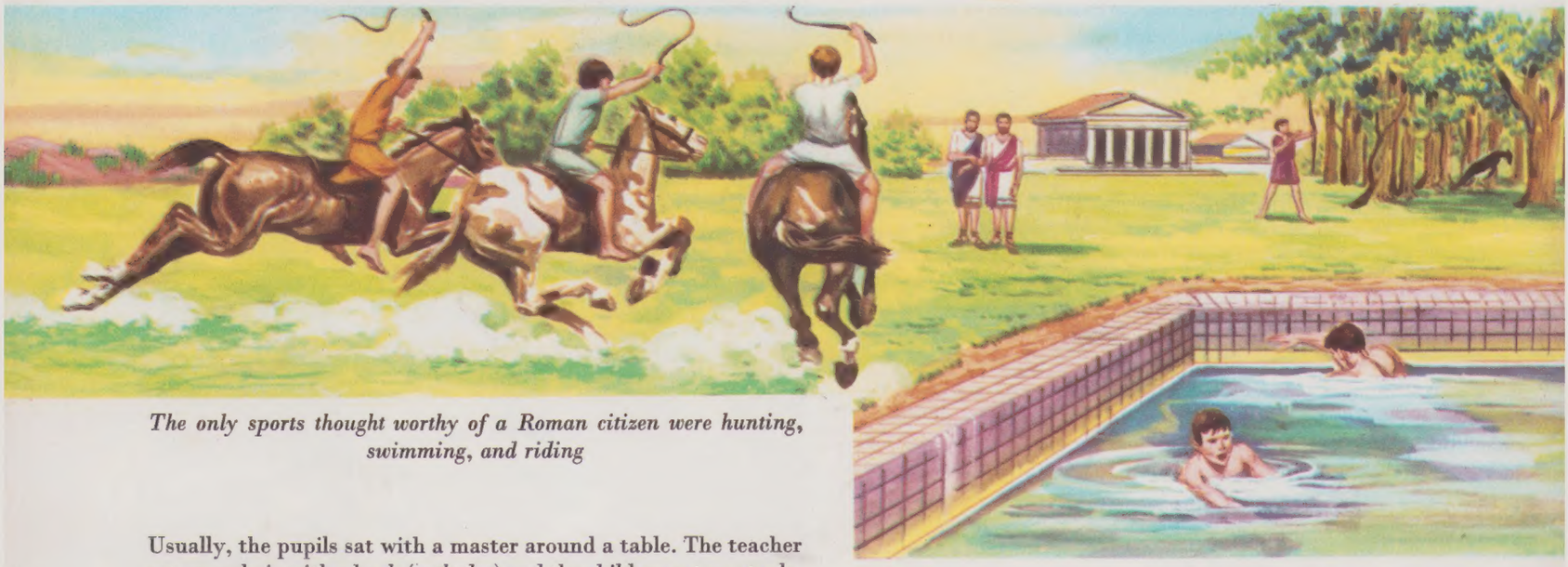

The only sports thought worthy of a Roman citizen were hunting, swimming, and riding

Usually, the pupils sat with a master around a table. The teacher sat on a chair with a back (*cathedra*) and the children sat on stools.

The child began his schooling at the age of 7 and continued until he was 12. Most children did not go beyond this elementary education. Because contact with the highly civilised Greeks made a higher level of intellectual education necessary for some boys, secondary schools for grammar and rhetoric were formed. The teaching of grammar helped the boy to express himself correctly by studying the works of Greek and Latin writers. The schools of rhetoric prepared the Roman youth for political life. These schools produced the best state officials and many governors of provinces.

But the schools in which the Roman boys were educated, and the methods used there, were most unsatisfactory. The schoolmaster was paid a low wage and was often not sufficiently qualified for his job. He tended to be rather fierce and often beat his pupils. Quintilianus (about A D 35–40), one of the most enlightened educationists of all time, protested strongly against the cruel punishment given in Roman schools. Quintilianus thought out his ideal of elementary education, which had the support of other enlightened men of his time, but, unfortunately, it was never put into practice.

Christian education

In the centuries which followed the birth of Christ, the teachings of the New Testament increasingly influenced the education of young people.

'Suffer little children to come unto me and forbid them not', Jesus said; and 'But whosoever shall offend one of these little ones, it were better that a millstone were hanged round his neck and that he were drowned in the depths of the sea'. These sayings showed an approach to education which contrasted strongly with the Roman tradition.

Church schools

The Church founded various schools during the 5th and 6th centuries to educate young people in accordance with Christian principles. The chief of these were: the catechumen schools, which instructed those intending to become Christians; schools of exegesis (explanation), which interpreted the Holy Scriptures; and episcopal schools (founded by bishops), for people wanting to become priests.

Charlemagne (A D 768–814)

When Charles the Great, or Charlemagne, was crowned emperor in A D 800, he set himself the task of educating, intellectually, morally, and religiously, all the peoples of his vast empire. He invited scholars from many countries to his court, in his effort to raise his people out of barbarism. He directed his attention first to the clergy, for he saw them as the proper teachers of the mass of the people.

Many schools were founded in all parts of Charlemagne's empire, which, in accordance with his objectives, could be attended by all children. Among the scholars Charlemagne employed was Alcuin, Bishop of York, who became the master of the Palace School and the chief minister for education for the territory. The Palace School (or Palatine School) may be considered as the first mediaeval university, for the most learned men of the time were actively connected with it. Alcuin determined the programme to be followed by the schools throughout the Empire.

Seven main subjects were studied, divided into the *trivium* (from the Latin *tres*, three), the study of three of them in the elementary schools, and the *quadrivium* (from the Latin *quattuor*, four), the study of the other four in the secondary schools. The trivium consisted of grammar, rhetoric, and dialects; while the quaduvium was concerned with arithmetic, astronomy, geometry, and music.

The influence of Charlemagne upon English education was considerable. Offa, King of Mercia, asked Alcuin for help in educating his subjects; Alcuin responded by sending his pupils to teach the English. Alfred the Great, towards the end of the 9th century, followed very closely the methods employed by Charlemagne to educate his people.